



EARTH SYSTEM RESEARCH LABORATORY

Serving Society through Science

Carbon dioxide, methane, and climate forcing

James Butler

Pieter Tans

Ed Dlugokencky

Arlyn Andrews

Andy Jacobson





Overview

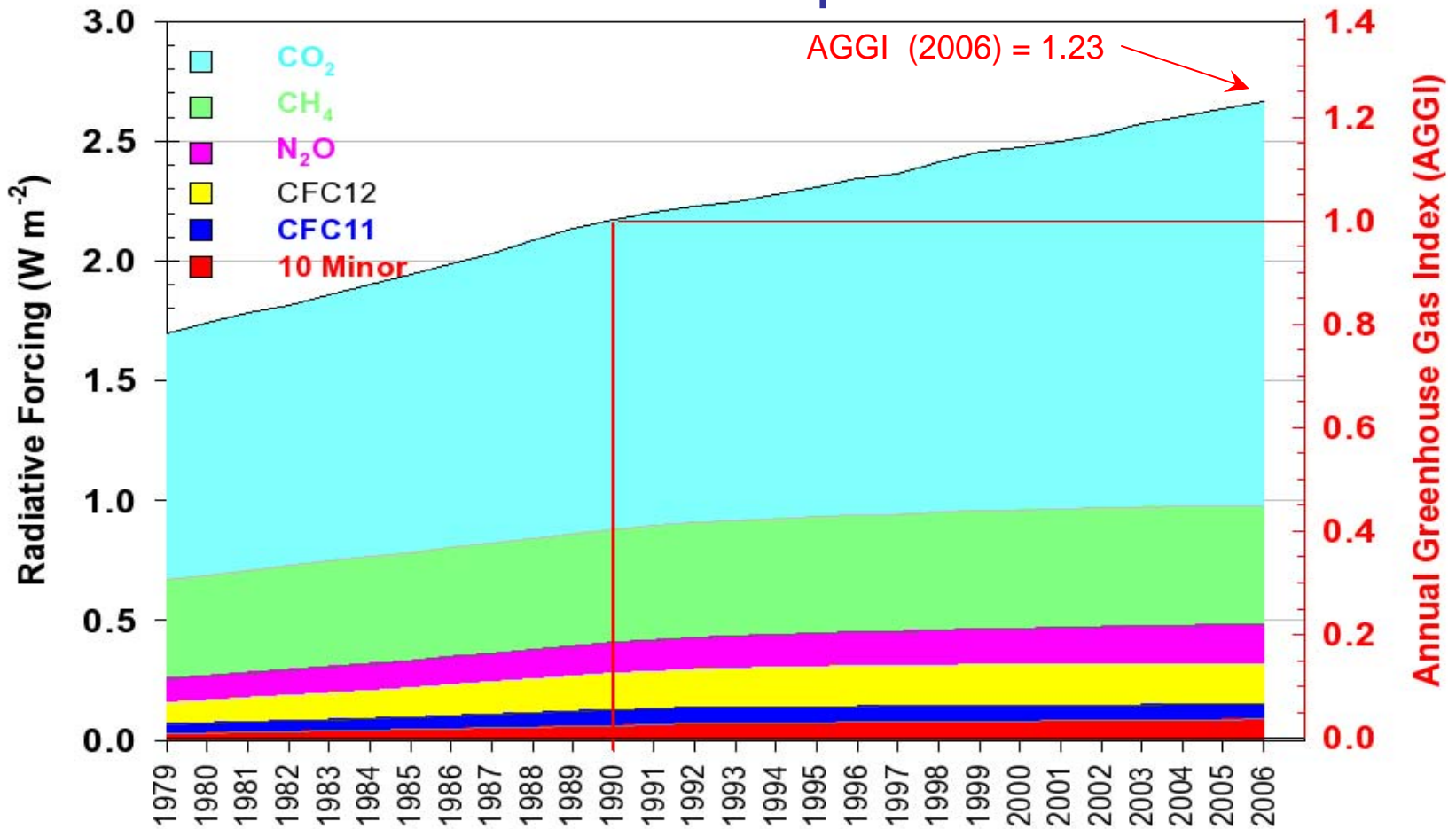
- Why this is an important area for long-term research
- How our efforts fit in to the big picture
- How we get data – observations and networks
- What we produce from these data

Why this is an important area for long-term research





Annual Greenhouse Gas Index (AGGI) 2nd and 3rd Updates

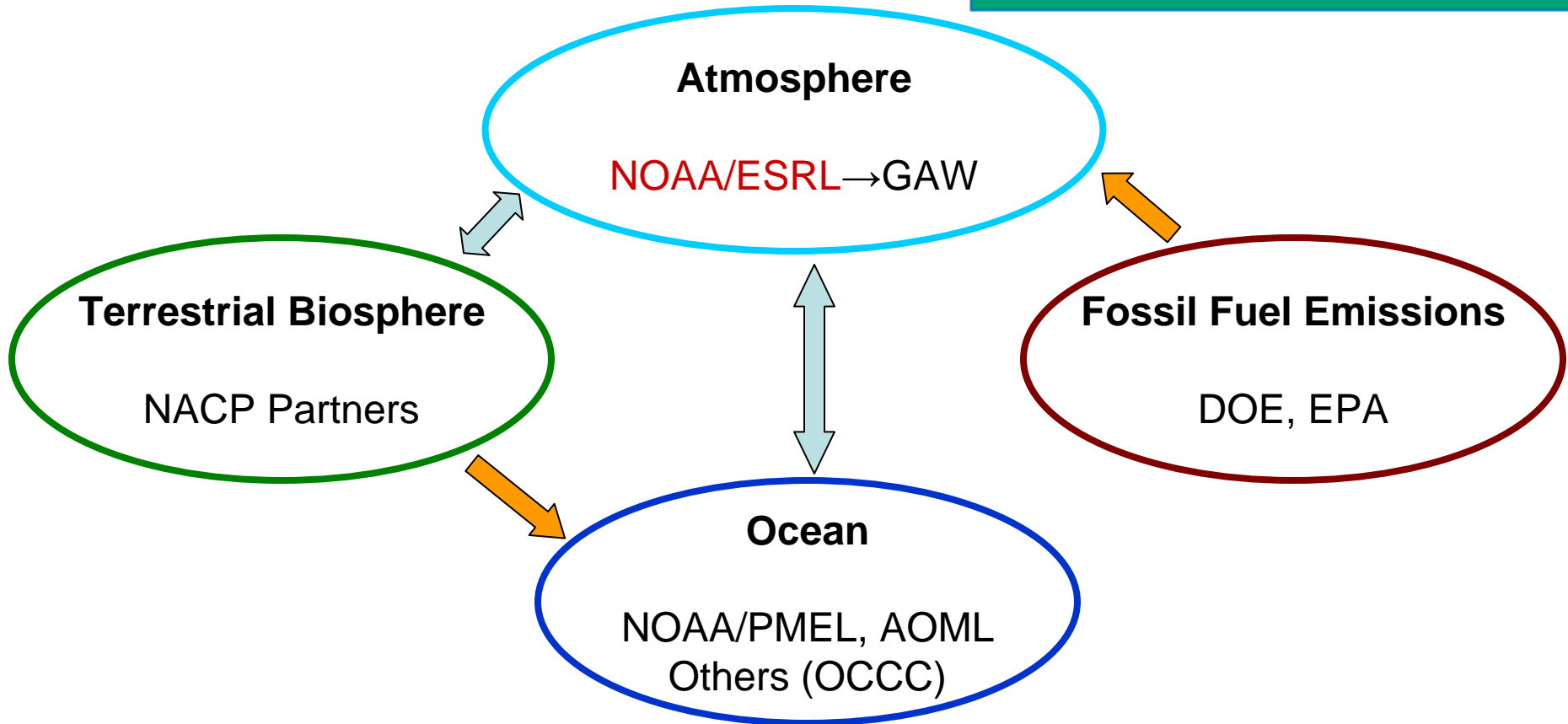
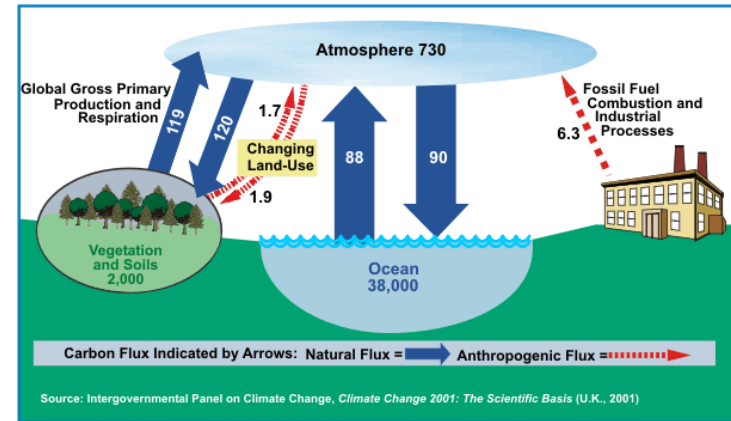


How our efforts fit in to the big picture





Understanding the Carbon Cycle





National Linkages

- NOAA Strategic Plan – Climate Mission Goal
 - Desired Outcomes
 - A predictive understanding of climate
 - A climate literate society
 - GPRM Performance Measure: *Reduce uncertainty in estimates of the North American Carbon Sink*
- US Climate Change Science Program
 - Goal 2: *Improve quantification of the forces bringing about changes in the Earth's climate and related systems.*
 - Carbon Cycle Interagency Working Group
 - North American Carbon Program
 - Ocean Carbon and Climate Change
 - Scientific Steering Groups
- Carbon Dioxide Information Analysis Center



International Linkages

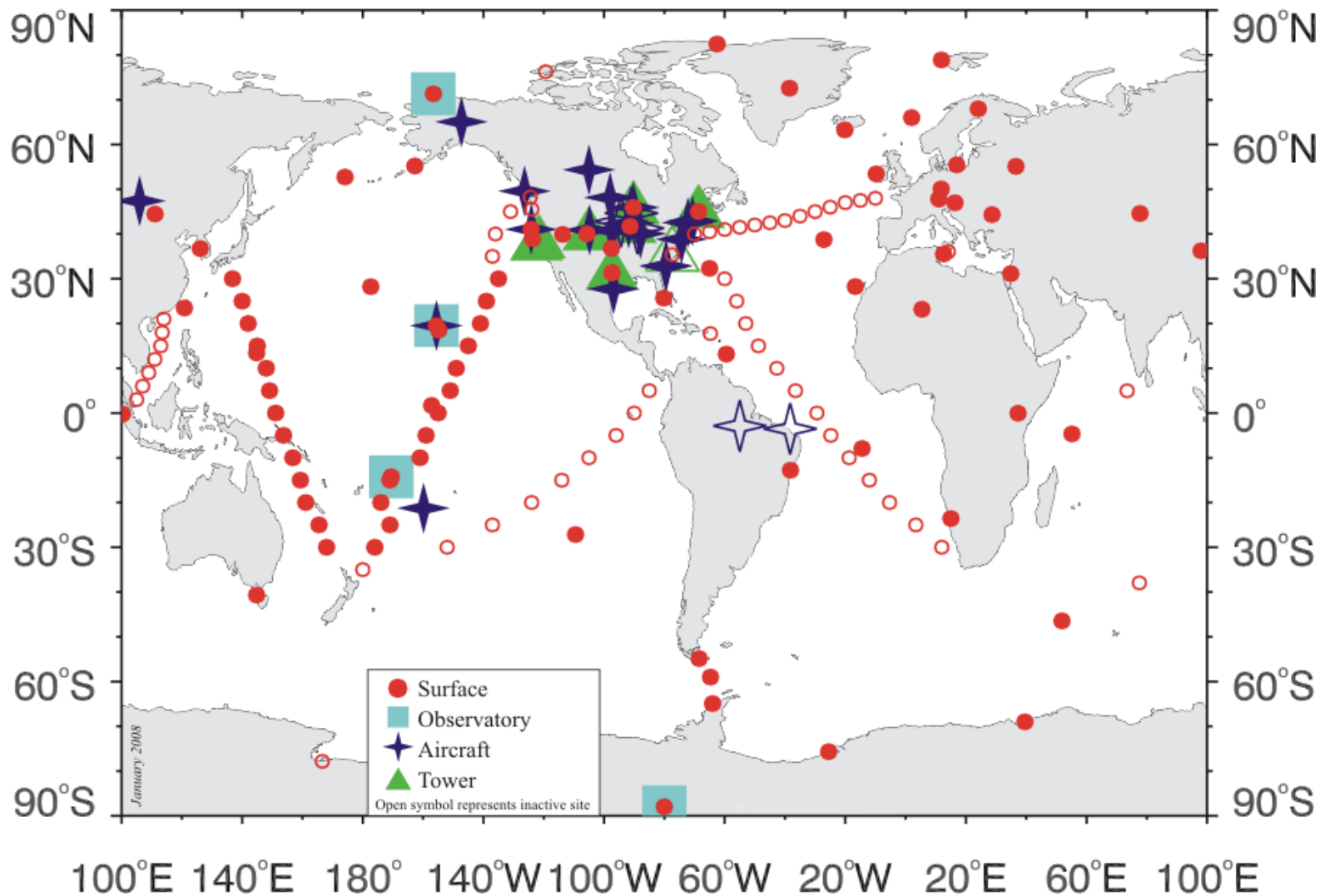
- World Meteorological Organization
 - Global Atmospheric Watch
 - ~2/3 of global sites and measurements for carbon & GHGs
 - World Central Calibration Laboratory & Calibration Centre
 - Leader in technique development and training
 - World Data Centre for Greenhouse Gases
 - Scientific Advisory Committee (GHGs) & Experts Committee
- Global Earth System of Systems
 - Global Climate Observation System
 - Atmospheric Observation Panel for Climate
- Data and Information relevant to several international programs, e.g., IPCC, UNEP

How we get data – Observations and networks





2008 Measurement Programs





Cooperative sampling

In situ sampling

Tall Towers



Sampling, Analysis, Calibration

World calibration scale



Automated flask analysis



Portable flask packages

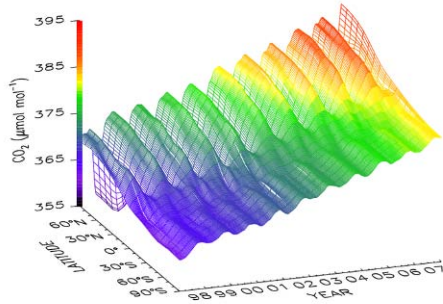
Light Aircraft



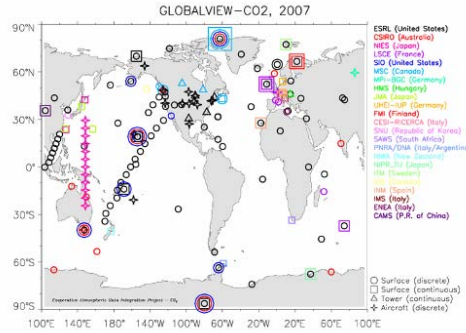
What we produce from these data



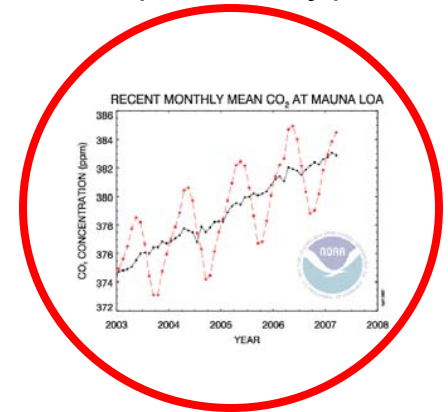
Data sets & Visual displays (variable)



Globalview, (annual)



Global trends (monthly)

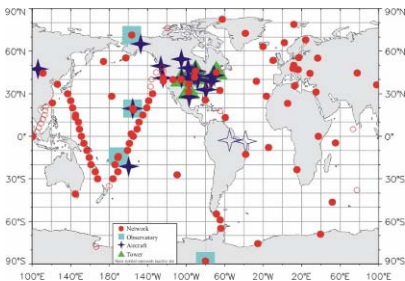


DATA

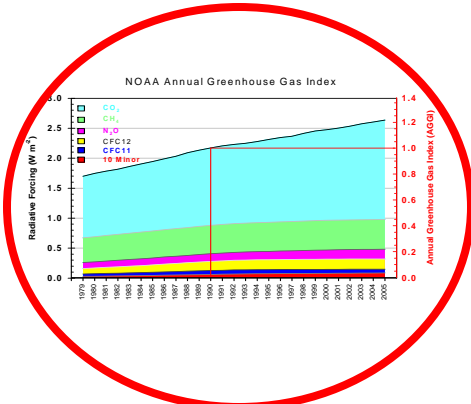
Stewardship
→
Creativity, Analysis

Products Services

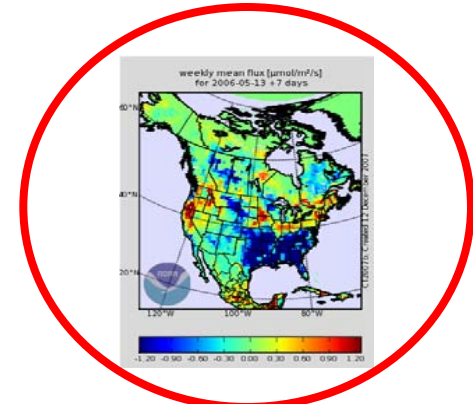
IADV (daily)



AGGI (annual)



CarbonTracker (annual)





Other products and services that depend upon our CO₂, CH₄, and related data

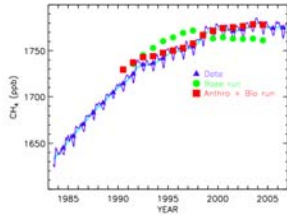
- > 50 Publications in refereed literature (2004-2007)
- Cooperative Products
 - WMO Annual Greenhouse Gas Bulletin (**New-2006**)
 - IPCC Assessments and Reports (AR 1,2,3,4)
 - CCSP Synthesis and Assessment Products (SAP 2.2)
- Cooperative Services
 - World Data Centre for Greenhouse Gases
 - Carbon Dioxide Information Analysis Center
 - WMO Central Calibration Lab and World Calibration Centre

Summary

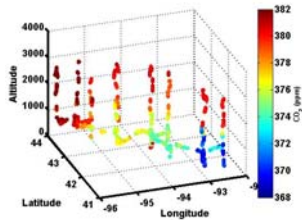
- We are committed to developing and maintaining, **long-term, widespread networks** for CO₂, CH₄, and related gases.
- We are dedicated to making the **highest quality** measurements, by maintaining calibration scales and leading intercomparison efforts.
- Our **fully accessible data** inform a global understanding of the carbon cycle through numerous publications, assessments, and cooperative efforts.
- Our **products** reach out to a broad spectrum of society, including scientists, educators, bureaucrats and even policy-makers.



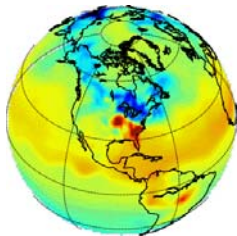
Carbon dioxide, methane, and climate forcing



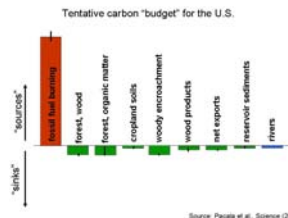
Global Monitoring: Trends and Distributions
(Dlugokencky)



Tall Towers and Vertical Profiles
(Andrews)



CarbonTracker
(Jacobson)



Future Plans and Directions
(Tans)

